THE LANCET.

Vol. V.—No. 4.] LONDON, SATURDAY, Oct. 30, 1824. [*Price 6d.*

SURGICAL LECTURES,

DELIVERED BY

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LECTURE 4.

GENTLEMEN,

As in general diseases we name the disease from its peculiar character, so in local diseases we also name them from certain peculiarities which they may exhibit. We find the disturbance of one part influencing the sanguiferous, nervous and absorbent systems generally; but we may have local disease without such phenomena taking place so extensively, but confined only to the neighbourhood of the part. Diseases have been classed according as they have exhibited the characters of a disordered state of either of the systems I have just mentioned: therefore, adopting the same plan, I shall begin with disorders of the vascular system, and shall speak of

Inflammation.

And first, of the most violent kind of inflammation, namely, *phlegmon*, which is the most common form of inflammation, and generally takes place in a good constitution. But I always like to keep to cases, and I shall give you the following. Supposing some very powerful stimulus to produce a violent local irritation, as a piece of glass or iron sticking into a man's arm, and by sticking there, should be attended with heat, redness, throbbing, pain, and swelling, the part is said to be inflamed, and the inflammation is said to be phlegmonous. But what does common sense tell us to do, but to pluck out the foreign body, as the glass or the iron, and to apply a wet cloth to the part? The irritation being removed, the increased action subsides, and the inflammation of that part is said to terminate by resolution. I have described a case, being very simple, and in which nothing more need be done. But the question is, how all these circumstances are produced: here I have been pleased to enter into the theory of inflammation, not that I invariably do so, but to afford you a specimen of medical theory, and to fix your minds attentively upon the character of phlegmon. The question is, can we account for all the phenomena upon a plausible or verifiable theory? Let us try if you please: On a sudden, there is a great *swelling*: from whence does this arise? There is, it may be, some effusion into the interstitial cellular substance, which augments the bulk of the part. But an inflammatory swelling subsides upon putting on the tourniquet; the effusion then is not adequate to account for the

very considerable bulk, it accounts for it in some degree. Well, we suppose the bulk to arise partly from the effusion, and partly from the turgescence of vessels. But the vessels are overcharged and distended with blood, and the part which is inflamed looks *red*; it was naturally pale; this, it may be said, is owing to an increase of the heart's action, forcing the red blood into vessels naturally carrying a colourless fluid; but there is something more than this, and that there is something more is rendered plain by experiment. Mr. HUNTER created inflammation in the ear of a rabbit; he had the animal killed, and immediately injected the rabbit from the aorta, but the vessels of the inflamed ear appeared larger and more numerous than usual, they were, therefore, preternaturally injected; now, if this increase in the size of the vessels had depended upon the force of the heart's action, the vessels of both ears would have been filled equally. Now we believe that the arteries of the inflamed part are not only more distended than natural, but there is also an absolute increase in their actions beyond those of the surrounding parts.

The more you consider the phenomena of inflammation, the more you will be inclined to receive this opinion, as I believe. But let us proceed. This supposition explains most of the other circumstances; it explains the redness, heat, and the throbbing of the part. If we take the commonest example; for instance, some stimulant is applied to the skin, it excites the actions of the part; you see that there is a swelling produced, and the skin is red. Now the redness is the effect of the preternatural injection of the red blood into vessels which did not naturally receive it, and the heat of the part also arises from the same cause. The surface of the body is much colder than the interior; but as the vessels of the skin become larger, the heat becomes greater. Mr. HUNTER tried to discover if there was any increase of temperature in inflamed parts internally, and for this purpose he injected some stimulating fluids into the rectum and vagina of an ass, and then introduced a thermometer, but he found there was no absolute increase in the temperature. But in the more superficial parts of the body, there is a comparative increase, because the heat is greater than it before was in that part, but not greater than it before was in the blood of the interior. Then there is the throbbing of the part; ah! what is it that causes the throbbing in a part in which there was none before? Why the pulsation of arteries carrying the blood, certainly it is, which causes this feeling.

One fact being granted explains all the phenomena, and to show you that the throbbing does depend on the flow and injection of the blood from the heart, you will find it perfectly synchronous and simultaneous with the pulse. But there is another circumstance which I must lead you to notice; it is that which I have before hinted at, namely, that there is a disposition in the arteries of the inflamed part, not only to receive a greater quantity of blood than natural, but also to act on that blood with greater frequency than natural. In whitlows, for example, the arteries of the part inflamed, and the digital arteries, will throb powerfully, and the ra-

dial and ulnar arteries too, if the inflammation be very severe, and I have even known the excitement so great as to cause the brachial artery of that side to pulsate strongly. Now if you put your finger on these arteries, and on the same arteries of the opposite side, you will find there is an absolute increase in their pulsations. It is curious to see how far this disposition to pulsate does extend from the inflamed part. There are some arteries which pulsate, others which do not. The abdominal aorta always throbs, but more sometimes than at others, so much so, as to induce many persons to suppose that they have aneurism, and many medical men have I seen who have believed this; but it is dependant principally on the state of the stomach, for that organ very much influences the heart's action, but by taking a little bitters and a few drops of one of the mineral acids the aneurism has disappeared.

There is then a disposition in the vessels of an inflamed part to receive a greater quantity of blood than natural, and there is in severe cases also an increase of the heart's action. We have been able to account for the swelling, heat, redness, and throbbing of a part, and we have now to consider the cause of them. Some people talk a great deal about *pain*, and I could tell you a great deal of what has been said, but it would be only a waste of time. The whole part is inflamed, the vessels, nerves, and absorbents, and therefore we need not be at a loss for pain. But, say some people, the inflammation of the arteries is not the cause of pain; they are elastic, they admit of distension, like an inflated bladder; but JOHN HUNTER said that the pain was as great when they are contracted, as when distended. You see that we cannot gain any thing by this supposition. Oh! there is no doubt but that the nerves are inflamed in common with the other structures, their fibres are put upon the stretch and their sensibility is increased by the excitement into which the part is thrown; we may in this way easily account for the pain.

Well, I have accounted for all the phenomena, by the supposition that the arteries have a propensity to receive an undue quantity of blood. But what gives them this propensity? This is more than I can tell, or, I believe, any body else can tell. Arteries, when inflamed, are supposed to have their coats thickened as well as their calibre increased. But I desire you to fix your minds upon a phenomenon in inflammation which has attracted the attention of all observing men. It is the resistance given to the touch by an inflammatory swelling. You press it, and you can make but little impression on it, and it seems to furnish some considerable resistance. Now how can this happen? The arteries are continuous with the veins, and, if there were no resistance, the blood must pass from the one set of vessels into the other. But there is an inflammation of the skin, which is scarlet in appearance, but then it yields readily to pressure, and the part becomes pale. But not so in plegmonous inflammation; and that led BOERHAAVE to believe that there was an obstruction to the circulation through the smaller sets of vessels, from the extreme lentor of the blood, and led CULLEN to believe that there was a spasm in the extreme vessels, and later investigators to believe that there was an

obstruction in the capillary vessels; other experimentalists believe that there is a surcharge merely in the quantity of blood sent to the part, and that it cannot be returned in the same quantity by the veins, and thus attempt to account for the accumulation in the arterial vessels. They say, which I cannot believe, that this is sufficient to account for the resistance. Now, supposing I were to speculate as to the cause of resistance, I should say it was owing to the obstruction of the extreme arteries, and I should be led rationally to suppose a cause, namely, the irritability of these minute vessels. There are, as I before said, some arteries which pulsate, others which do not pulsate, and if you look at a frog's foot through a microscope, you will see the stream of blood passing steadily on through the minute vessels; if you irritate the part by pricking it with a pin, you will see a globule of blood try to force itself through a vessel, but it cannot, and it then passes off by another anastomosing branch, but supposing the irritation to be continued, the action is increased, the pulsating arteries increase, and the arteries which before carried a colourless fluid now carry red blood and pulsate, and thus create a resistance. I own I am a Cullenian as far as resistance in the extreme vessels goes.

The principal phenomenon of inflammation is, the preternatural distension of the pulsatory arteries. This action will fatigue and weary them, and they might be so fatigued as not to be able to contract again to their former size, some people say; but unless you apply the powers of common muscular action to the blood vessels, I do not see why this must happen. The office of some muscles requires that they should be fatigued, and should be followed by rest, but the blood vessels are never fatigued, they act 72 times in a minute for perhaps 80 years. Supposing a man possessed certain muscular powers, but that he was obliged to increase the ordinary effort a little, he might continue to do this for some time without getting weak, although there might be some subsequent debility. If a man, for example, be in the habit of walking twenty miles in the day, and should from some circumstances be required to walk twenty-five, surely this would be no proof of debility. Yet there are some who think that inflammation is weakness, but it seems to me to be preposterous. What! stick a piece of glass into a man's arm and have debility? No; there is an excited and increased action, and this accounts for the phenomena of inflammation. Who can doubt it?

Here I shall call upon you to attend to a circumstance which you will frequently have to consider in practice, the hæmorrhage from diseased arteries. A patient has a diseased knee; the surgeon finds that nothing more can be done for the disease, that it has become a source of irritation to the constitution, and he advises the patient to have it removed; he is perhaps, at the time, a little easier than usual, and he puts the operation off; he has a fresh attack of pain, and he asks the surgeon to remove it. It is done, and instead of having to secure two or three vessels, you find about twenty little vessels which bleed profusely, and perhaps requiring as many ligatures; the patient is put to bed, but the surgeon is called up in the night to stop the hæmorrhage,

which has again returned, and this may happen repeatedly. This was the practice formerly, but not now, because we always amputate beyond the inflamed parts.

Inflamed arteries, when divided, spout out the blood to a great distance, much farther than would have been the case in a healthy state of the vessels. Now, is this the action of the heart or of the vessels? The action of the heart cannot be partial; it sends the blood with equal force to all the parts of the body. Those who speculate upon the power of the heart's action seem never to have taken into account the following phenomenon: it is known to you, and it will be to all who study anatomy, that there are four little arteries which send their blood into the interior of the penis, and they distend it as suddenly as if it were injected by a twelve-ounce syringe. Is this the heart's action? or what is it? Certainly it is done by the power belonging to the vessels of the part. Granting then that there is a degree of resistance, we may explain very readily the other circumstances. Some have said there is no obstruction in the extreme vessels; but I say there is an obstruction, because the blood is not driven into the veins in the same proportion as the arteries receive it, and I am disposed to believe that there is a spasm in the extreme vessels, from noticing that the *secretions* of inflamed parts are always interrupted. In nephritis you cannot get a drop of urine, or if you do it is mixed with blood, and the return of the secretion affords you a good proof that the inflammatory action is subsiding. I once had a dreadful attack of ear-ache, and I dare say most of you know what that is; well, it went on, became worse and worse, such a noise in my head as if twenty hammers were at work, and the pain dreadful; all at once there was a terrible crack, out something went with a very buzzing noise, and I was easier directly. Why, it was an inflammation of the lining membrane of the ear, and it had terminated by the secretion of pus. The effects of phlegmonous inflammation on surrounding parts are worthy of notice; and you will find a different treatment necessary for the different kinds of inflammation.

Well, as to the *treatment of phlegmonous inflammation*, why, as I told you before, all that is necessary is to remove the irritation; apply wet rags to the part, and then it will terminate in resolution. Wet rags! what good can they do? Why, one of the most powerful modes of checking increased action locally, is to diminish the temperature of the part. Here I would observe, that when noticing any point of surgical practice, I do so once for all, and do not return to it. Heat, to a certain extent, is necessary for all vegetable and animal action: increase the temperature, and these actions are increased; diminish the temperature, and these actions are diminished. This is the proposition; but whether it is true is the point. That it is the case, I think, is apparent from the influence of the returning spring upon the vegetable kingdom, and hyburnating animals, they leave their abode, and commence a new series of actions; on the return of winter we find both again shut up in a state of indolence and inactivity. Now,

although we are not dormice, we feel the change from cold to heat very agreeable, and we know that severe degrees of cold very much diminish our muscular efforts. When Dr. SOLANDER was with Captain Cook, in his voyage round the world, a party landed on some part of North America, and he had just been cautioning them against the benumbing and stupifying effects of cold, and of the danger there was of giving way to such feelings. He had just finished what he had to say on the subject, and he was taken in the very way himself. He said, "I am very weary, let me lie down; do let me lie down only a few minutes;" but, if they had, he would never have raised himself again: the other officers insisted on his exerting himself, and absolutely drove him before them, and it was with the greatest difficulty that he could reach the ship. Soldiers and seamen have, in very cold climates, frequently perished by yielding to this desire to rest. They have stepped aside from their companions, and laid down, as they supposed, to sleep; but it was with them the long sleep of death.

Heat, on the other hand, augments natural action. There have been certain *savants* who have put animals into a room hot enough to broil beef-steaks in twelve minutes; and what was the consequence? Why, to increase the pulse most astonishingly. But were the animals' actions increased by it? Certainly not. The poor things could not skip about if they would, for one part of the room was just as hot as the other. Now, if you wish to diminish the temperature of a part, you do so by evaporation. You may convert water into ice in this country, even in the summer, by this process. Ice has been made at Benares, in the East Indies, by evaporation. Now, to produce the proper effect of evaporation on the animal body, it is not necessary that you should freeze the part, you only wish to diminish the excess of heat; well, then, you apply wet rags, wetted either with vinegar or vinegar and water. There are various modes of producing evaporation, and you would have no such effect produced if you were to wet rags, and then put them and the part they covered under the bed-clothes. It is necessary it should have access to the air; the heat of the part makes the water gaseous, and the air carries off the heat from the part. Sponging the part, and allowing it to evaporate, is a very good plan; but then it should be done regularly and constantly; the heat of the part will rapidly diminish, and you should continue it until the temperature of the part is below that of the other parts. This is the most potential way of producing evaporation. Some men kill parts of the body very quickly by evaporation; but I do not think we have a right to kill parts. A man has an inflammation of his knee, you give him an evaporating wash, and tell him to keep his joint always covered with a piece of wetted linen; the rags smoke as if they were laid on a hot iron, and he feels the greatest comfort from applying them. But yet I do not like the words "cooling applications;" I would call this part of surgery the *regulation of temperature*; but not take the law into our own hands, and so diminish the temperature of parts as to kill them. Poultices made without

lard evaporate; if there be a surplus of heat, they will evaporate; but I call a poultice a local tepid bath, and I would not, therefore, put them on cold.

I shall speak of the *bread and water poultice*. The way in which I direct it to be made, is the following: put half a pint of hot water into a pint basin, add to this as much of the crumb of bread as the water will cover, then place a plate over the basin, and let it remain about ten minutes, stir the bread about in the water, or, if necessary, chop it a little with the edge of a knife, and drain off the water, by holding the knife on the top of the basin, but do not press the bread, as is usually done; then take it out lightly, and spread it about one third of an inch thick on some soft linen, and lay it upon the part; if the part to which it is to be applied should be a wound, you may place a bit of lint dipped in oil beneath the poultice. It is very comfortable and soothing to the part; it is like a bath of tepid warm water, it produces a perspiration on the part to which it is applied. I do not know a better application. If there should be a surplus of heat in the part, you may expose the poultice, and allow the evaporation to go on a little. The poultice may be made with poppy water, if you think sedatives are necessary. It may be made also with the hemlock juice, if recently expressed, and it is a very good application to irritable sores. So also you may make a carrot poultice, but it should not be made with the great coarse substance of that vegetable, you should use the recent juice. It admits of medication, does this poultice; but there is nothing better that I know of than the bread poultice for broken surfaces.

There is an erroneous notion prevalent, that cold is bracing, and heat is relaxing, but you need only consider this to see its absurdity. Heat excites action, how can it relax? Now I grant there is a difference between heat and moisture, and mere heat. But cold is bracing, what is meant by that? They say a cold bath is bracing; ah! a man jumps into a cold bath, and he feels chilled; he jumps out again, and rubs himself all over with a coarse cloth, he is invigorated, refreshed, and cheery; he feels as if he could jump over the moon. The heat and vigour that he feels is not from the cold water, it is the result of the reaction which follows, it has roused the action of the heart and arteries, and produced a temporary vigour and hilarity. If a man takes a glass of brandy he feels vigorous enough afterwards, but you cannot say that the brandy is bracing. To try the experiment fairly, you should keep him in the cold water a length of time, and see what a poor shivering wretch he would be; why you might almost knock him down with a feather. (A laugh.)

I do not now speak of leeches or any thing of that kind; I have spoken to you of blood letting when on the subject of inflammatory fever, that is, when there is inflammation of some vital organs.

But bleeding a man for phlegmon, and leeching him, would be all nonsense; the inflammation will either subside spontaneously, on the removal of the irritating body, or will proceed to another termination, of which I shall speak in my next lecture.

LECTURES

ON THE

PRINCIPLES AND PRACTICE

OF PHYSIC,

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LECTURE 4.

You will, perhaps recollect that in the preceding lectures I described two of the leading varieties of what I generically termed *common fever.*

The first leading variety was the *Common Congestive Fever;* a state of the system produced by the operation of common depressants, and marked by a diminution of the heart's action, by a diminution of the animal heat on the surface of the body, and by disturbance in the function of this or that organ, which is the seat of congestion.

Common congestive fever, I said, might terminate in three ways; 1st, it might be solved by the means employed; 2d, by these means it might pass into the stage of excitement; 3rd, it might pass into that stage by the natural efforts alone.

The second leading variety of fever which I considered was, the *Common Simple Fever;* a state of the system in which the heart's action is rather quicker than natural, and the animal heat, on the surface, rather higher than natural. In this variety the blood circulates with greater rapidity round the whole body than natural; so that all parts are excited, but none positively inflamed. I also endeavoured to shew that this variety of fever might be produced *directly* and *indirectly;* that it was produced *indirectly* when it arose from depression, that state produced through the influence of depressants, which I call the stage of depression, and in which the blood is driven from the surface to the centre; but the action of the heart is roused by this accumulation of blood on its right side, it exerts itself powerfully, and throws the blood from the internal to the external parts of the body; the animal heat is thus again restored on the surface, and the whole vascular system, through the heart, is in a greater state of activity, or, in common language, fever is fully developed. But this condition, called fever, may arise *directly,* without any cold stage at all; the stage of excitement may be immediately produced through stimulation, the effect of stimulants, and then it commences by the stage of excitement, and terminates by the stage of collapse. Stimulants increase the heart's action at once through the nervous system, and fever is produced having only two stages. In regard to irritants, it may be mentioned that high and low degrees of temperature are both irritants; a stream of cold air in motion excites sometimes inflammation, whilst cold air at rest excites no such effect. This was particularly observable in the late expedition towards the north; the men could withstand the influence of the atmosphere even when many degrees below *zero,* if the air were at rest, but when exposed to it in motion, with even a light breeze, the cold was insufferable as an irritant. Again, high degrees of temperature produce an increased sensibility and redness of a part; the heat operates first on the nerves of the part, and then on the capillary vessels. *Local irritation,* however, is sometimes combined

with a general shock or depression; and then, if fever be regularly developed, there are three stages,—a first of depression, a second of excitement, and a third of collapse.

Let me advise you to be particularly careful in the examination of all abstract terms; we think in words, and if our thoughts be distinct, our words will be clear and intelligible; but if our thoughts be not distinct, the words will be obscure and unsatisfactory.

I have employed the distinctive terms *general simple excitement*, and *local simple excitement*; as an example of the first I might instance the state of the circulation in advanced pregnancy, in addition to the former examples. The blood then often circulates with greater rapidity than usual, yet, being equally distributed, it does not meet with any interruption, and consequently no inflammation is produced. But in local simple excitement the capillary vessels of the part are somewhat more loaded with blood than in the ordinary state, yet the combination of symptoms denoting inflammation is not present, as I have already shown.

The great object, in the management of common simple fever, is to prevent the occurrence of inflammation. Inflammation, it must never be forgotten, may arise in the progress of common simple fever, and thus it may be converted into common inflammatory fever, though unquestionably it often begins and terminates as common simple fever; that is to say, it is merely accompanied by general and local simple excitement; conditions of the vascular system which, I repeat, are separable fairly from inflammation.

Common Inflammatory Fever is the next variety; and it may arise, *first*, as a consequence of the common congestive fever; *secondly*, as a consequence of the common simple fever; and, *thirdly*, it may arise independently of either one or the other, as a primary variety. It is very important in a preventive point of view, to remember the *remote predisposing and exciting causes* of common inflammatory fever, and therefore I shall begin by considering some of the more remarkable of these causes.

I have already mentioned and illustrated, that the whole range of pathological inquiry might be divided into *three* great leading conditions: *first*, predisposition; *secondly*, disorder; and *thirdly*, of disease. Predisposition is the tendency or liability which certain parts of the body have to disorder or disease. Some of the ancients, were well aware that the human body contained within itself certain propensities to disorder or disease. For instance, Demosthenes, in one of his addresses to the Athenians against Philip, makes use of this very circumstance by way of encouragement, telling them, that however strong he may seem now that he is successful, yet if he but once receive a shock, all his weak parts would be discovered, as happens in the human body, whether they be sprains, fractures, or other faults. Celsus also says, that the human body, apparently sound, will show its weak parts if disturbed. There is, however, a higher authority than either Celsus or Demosthenes, to which we can refer for the support of this opinion, namely, observation guided by *common sense*. Indeed there is scarcely a man to be found in civilized society, who might be said to be born perfectly sound in all the physical structures.

Predisposition admits of some divisions and sub-divisions. It is, *first, hereditary.* If we look to the affections of particular families, we cannot but perceive that this is the case; some are especially attacked by inflammation in a particular part, as in the head, windpipe, lungs, or throat. Lord Bacon observes, that there is one point of anatomy which has not been sufficiently investigated; namely, comparative human anatomy. Now the probability is, that if we were to examine the internal structure of organs, which are more uniform than the external in different families, we might be able to throw some light on this obscure department of predisposition.

Another, or a *second*, division of predisposition, is that which I have termed *ætal*, or which is connected with age. In *infants*, in particular, we find there is one organ liable to suffer, for example, the brain, partly perhaps from its large size in proportion to the body; *secondly*, the sensibility and the contractility is also greater in children; hence stimulants and irritants make a greater impression on their nervous systems than on that of adults; and, by a law of the animal economy, it happens that when the sensibility of the nervous system is increased, the contractility of the muscular system is also increased. *Thirdly*, There is the irritation of dentition in children, which is often followed by fever and by some attack of internal inflammation. *Fourthly*, Children have a more delicate skin, and a more excitable state of the mucous membranes internally, than the adult, and therefore these are more liable to become inflamed. *Manhood*, and middle age, have their peculiarities; the serous, the fibrous, and the cellular membranes are then most disposed to inflammation; and, in *advanced age*, the head is a part very liable to be affected, probably from the state of the venous system becoming congested.

The *third* division of predisposition is *sexual*. There are peculiar organs, both in the male and in the female; but the sensibility and contractility is greater in the latter than in the former; their feelings are more acute, and their frames are more like those of children, and consequently some organs are more liable to inflammation.

Fourthly. Predisposition is also *acquired*, by habits operating after birth, or by the occurrence of some disorders: as measles, catarrh, small pox, and scarlatina; which, when severe, never leave the parts of the body which had mainly suffered in the same state in which they found them; but leave some latent fault; thus laying the foundation for future disorder or disease. Some *latent fault*, then, is the *first subdivision* of *acquired* predisposition. A *temporary increase* of the *sensibility and contractility* of the body, is the *second subdivision* of *acquired* predisposition. This temporary increase of the sensibility and contractility proceeds sometimes from *heat*. It arises from this cause in hot climates or in the summer of our own country; therefore many persons cannot take the same drinks or diets in summer as in winter without prejudice; for such as would do no harm in cold weather, will do so when the system is thus excited: and it is owing to this circumstance that bowel complaints are so frequent. This increased sensibility

and contractility might arise, secondly, from *mental anxiety*, operating first on the brain and whole nervous system, and then on the heart and other parts of the muscular system. It may arise, thirdly, from *want of sleep;* and, fourthly, from some *primary disorder* of the stomach, liver, bowels, and skin; or it is often induced by the use of particular medicines, especially mercury, so fashionable in London, that men are continually dosing themselves with calomel, or blue pill, and doing themselves a great deal of mischief. Therefore, I consider it my duty to enter my protest against so irrational and injurious a practice.

The *third* subdivision of *acquired predisposing* causes, is *general debility*. It is in this way that weak convalescents are liable to attacks of inflammation. They are peculiarly susceptible of the influences, not only of stimulants and irritants, but also of depressants. It is most important, in the treatment of fever, to regard the state of convalescence; for then patients, imagining that all danger is past, incautiously expose themselves to some exciting cause of disorder, and an attack occurs under the most unfavourable circumstances, and often proves fatal.

The *fourth* leading division of *acquired predisposition* is what the Greeks call *plethora*. It means a superabundance of blood. This plethora may be either *general* or *local*. When patients have general plethora, they have what has been termed the phlogistic diathesis. The *general plethora* occurs first in individuals who have any firm fibres, or generally of a florid complexion, and who bear blood-letting very well; but it, secondly, occurs in other individuals of a flabby fibre. There is a peculiarity in the appearance of the blood in both these cases: it appears to be loaded with a superabundance of the red particles. It occurs most commonly in persons who have retired from active life, who eat, drink, and gorge themselves,—who take little exercise, and have torpid bowels. The disorder takes place in this or that organ where the most blood is accumulated. There is also a *local plethora*. The patient shall be thin and spare, and the blood show a deficiency of the red particles; yet that individual shall be liable to an accumulation of blood in some part of the body. Perhaps, when we know more of the nervous system, we shall be able to explain this circumstance. The strong probability is, that the cause of this local plethora is the irregular distribution of the nervous energy, giving rise to an irregular distribution of the blood in the capillary vessels.

Having considered the predisposing causes, I shall now make some remarks on the *remote exciting causes* of common inflammatory fever. These, you will perhaps recollect, are depressants, stimulants, irritants, and interruptants, the influence of which I have already explained, except the last. As an example of an *interruptant* producing inflammation, I may instance a ligature applied round a limb interrupting the circulation by the pressure of the strictured part, as in strangulated hernia. Interruptants all act as irritants, and produce inflammation below the point where the interruption takes place.

It is an interesting point to ascertain in what relation fever stands to inflammation. Sometimes fever is the effect, and sometimes it is the cause, of inflam-

mation. We have supposed, with the public and the profession, that in fever a quicker pulse and a higher heat of skin exist than natural; and we have seen that this state sometimes arises indirectly from depression. When the stage of excitement has taken place in that case, if some part of the body possess an hereditary or acquired weakness, it becomes inflamed, and then the inflammation arises as an *effect* of fever, and not as the cause. When the fever arises from *stimulation*, and inflammation takes place, that inflammation is to be regarded as the effect of fever, since it plainly follows the latter. Take, for example, a weak convalescent; give him a basin of strong broth; it produces a state of general excitement; and that part which had been weakened by the previous disorder will become inflamed.

Inflammation, however, may be the cause of fever. Thus, by irritating the surface of the body of an infant by a blister, fever is not unfrequently produced; and, also, in like manner, from the irritation of an accident or operation, when it amounts to inflammation.

Some ingenious authors have not only insisted that fever is invariably attended by inflammation, but that this inflammation is always seated in a particular part. So many as four writers have fixed it in the brain, and others in the lining membrane of the intestines. The former seem to think, with the poet, that the head is

> "The dome of thought, the palace of the soul;"

and they have wished to lodge fever in a splendid apartment, in the drawing-room with folding-doors, in the cerebrum and cerebellum. It might as reasonably be placed in the great toe; and why not assign it one abode as well as another? I am sure that many aldermen, who take turtle-soup and punch at the same time, would much rather have it in their toes than in their heads. Suppose that a man were to fall from a height to the ground, he fractures his arm, and lies quite insensible; the system has received a shock, and the surface is clayey cold. Two students are passing by, and they come up to him; one is a *theorist* in favour of the brain, the other in favour of the mucous membranes; the first says, "This man's injury is in his head; he has an attack of inflammation there:" the second says, "No, it is not in his head, but in his stomach, for you see he is retching." A debate takes place, whether the patient is to be bled or not. An old practitioner comes in when they have just agreed about bleeding; but he says, "Whether his head or his stomach be inflamed I do not pretend to know; but one thing I do know, that if you bleed him you destroy him at once."

The fact is, that philosophers, in all ages, have been fond of blowing bubbles; and some elderly as well as young gentlemen have been fond of following them, vainly attempting to grasp these unsubstantial things of air. If you examine the body of a patient who has died of fever, you will frequently perceive no trace of inflammation in the mucous membrane of the intestines; and if you examine another, you can find no trace of inflammation in the brain; and, as no evidences existed of it in either case during life, it is in vain to say that an inflammation either of the brain or lining of the bowels is the exclu-

sive cause of fever. Indeed, fever may arise and advance without inflammation at all; and when inflammation does arise, from common causes, it is oftener the effect than the cause of fever, and may and does attack *every* structure of the body, more particularly the weak parts.

"ALL IN THE DARK" AT ST. BARTHOLOMEW'S HOSPITAL.

On Monday evening last, some two or three renegadoes, according to a previous arrangement, determined to put out the lamps to prevent any persons from taking notes of Mr. ABERNETHY'S lecture; and, in this way, very effectually, as they supposed, prevent its publication. It happened that our Correspondents at the hospital were the first to be let into the secret: we had received intimation of the plot as early as we wished, and accordingly took measures to frustrate it. To show these *literati* what importance we attach to their efforts, and to show them how imbecile their attempts to prevent our publication of the lectures are, we take this opportunity of announcing to them, for their comfort and edification, that they shall be favoured with a *verbatim* report of this lecture, although *delivered in the dark*, at the proper time.

The proposal to put out the lamps was received with much opposition; for it should be understood that the majority of the students at Bartholomew's have too much rationality, too much independence, to become the tools of a few half-witted, silly, hospital loungers, and, therefore, the proposal was objected to; but, before the opinion of the class could be taken, the signal was given by the commander, and persons stationed near the lamps immediately extinguished them. We are acquainted with this *Royal Staff corps* individually, and shall have hereafter to notice their separate exploits.

Mr. ABERNETHY presently arrived, and was not a little surprised, at the benighted condition of his auditory; laughing heartily, at the expense of the *viri sapientes* who had so ably distinguished themselves.

The lecture proceeded very quietly, and after it had finished the tumult began. To attempt to describe all that happened would be to describe the hideous noises of a Bartholomew fair!

Cries of lights—No lights—Order—Light the lamps—Chair—No Chair—Hats off—Stop them; stop them—Shut the door—Order, order—Lights, lights—followed each other in rapid succession. Order was at length obtained to an imperfect degree, and "Chair," "Chair," was repeated.

No one appeared. "What! *will no one take the chair?*" said a little gentleman.

Continued silence.—The question was repeated.—Silence preserved until the risibility of the greatest number was excited, and they burst into a loud laugh. Chair, chair, again re-echoed; and, after another long pause, a little man, with "spectacles on nose," in the gallery, was proposed by one who had been all the time summoning resolution for the purpose. He was desired to walk down and take the chair: but when he left the gallery for his *descent*, (and he certainly lowered himself quite enough in the estimation of the class,) cries of "Shut the door, shut him out;" "Let him in;" "No, no; open the door;" and, after keeping the president elect

waiting some time at the door very ungraciously, he was let in, and immediately proceeded to business.—"Order, order!"

Out of compassion to the poor little man, we shall, this time, omit his name. We can judge somewhat of a man's talents by his appearance, and certainly the opinion which we formed, on the first glimpse of this little personage was confirmed by the sequel. Short in stature, meagre and pale in countenance, visual orbs defective, with mental weakness still greater than his physical, did this poor little man commence the following speech. To observe the agitation, the anxiety, the trepidation, and the laborious effort required to preserve this sublime figure erect, one would have imagined that the mighty mental commotion would have been followed by a fierce eruption of sarcastic eloquence, or invective dire.

What did the crater of this parturient mountain produce? Nothing, save sounds as weak as the buz of a humming-bird, as unmeaning as the cackle of a goose. Only attend:—"Gentlemen, the business on which we are at present assembled is one of great importance: and, out of respect to Mr. ABERNETHY, I have been induced to take this situation; and, whatever the merits of the case may be, I hope it will be conducted with calmness and moderation; but, before I go any further, allow me to ask, whether we are to be favoured with any light?"—Light was allowed by all to be necessary, and light was accordingly furnished.

"I said, that I hoped the discussion would be conducted with calmness and moderation." "The discussion of what? What is it?" from all quarters, with great laughter. "Why, why—I believe—I think—that it is whether we shall have any light, or continue in the dark?"—"Bravo, bravo!—Huzza!—Order, order!—Chair, chair!"—"Really, gentlemen, you ought to behave better; it is a subject, as I before said, of *great importance*, and ought to be conducted with—" "I beg your pardon, Mr. Chairman," said a very knowing gentleman on the left, "for interrupting you, but the design for which you were placed in your present *dignified* situation was to state the object for which this meeting is assembled; it is to take into consideration whether the lamps are to be put out on the next evening, and whether this mode for preventing the taking of notes for publication in The Lancet can be effective."—"I thank you, Sir," said the Chairman; "and I am of opinion—" "Mr. Chairman," said a gentleman on the right, "I think that any attempt of this kind to prevent the publication of the Lectures in The Lancet will be quite unavailing; for, depend on it, that The Lancet does not entirely rely on the Lectures of the present course, but only adds Mr. ABERNETHY'S recent anecdotes to the matter of his former Lectures." (Great applause.) "That appears, indeed, very probable," said the Chairman; "but what can we do in this case?" (Silence.) "Can any gentleman tell what is to be done in this *very important business?*" (Loud laughter, all confusion; some putting on their hats, and going out,—others crying, *Shut the door.*)

A pupil at last got up, and proposed, that "the lamps should be lighted on one side of the theatre only; that those who wished to take notes should go on that side; and that a committee of *sixteen*

gentlemen should be appointed to watch, attentively, the conduct of each person." Bravo! Excellent!

"Mr. Chairman, I propose," said another, "that the front seat be allotted to those persons who wish to take notes, and that a committee of *twelve* gentlemen be appointed to watch the rest." Order, Order!—Question, question! "Really, gentlemen," said the able Chairman, "unless you do behave better, it is impossible to get through this *very important business*; and you know, that if The Lancet should get hold of this evening's meeting, it will have the *laugh against us*,—you know it is very severe." "It has it already," said a gentleman opposite. (Great laughter, and applause.)

One thing was thus proposed after another, and nothing done, when a student observed, that a gentleman had been pointed out to him as being the person who furnished the notes to The Lancet, but he did not know his name or his person, (a laugh); that is, not exactly: but he had seen him, when he came into the theatre. (Another laugh. "Can you see him now? Look round.") "No, I cannot." At last he said that he thought he did see the gentleman alluded to; and some discussion arose, whether he should be asked publicly, or by letter, if he did furnish the notes of The Lancet? The former mode was decided on; and some unlucky gentleman, opposite this lynx-eyed observer of persons, was fixed on, and asked to satisfy the meeting on the subject; which he did, and was corroborated in his declaration by some other gentlemen. What was to be done next? Why, an apology must be proposed, as publicly, to the gentleman unwittingly pitched upon; which was accordingly done. (Great applause. Cries of Bravo!)

"Mr. President, *order, order*, Mr. President, I say." Order having been restored, "Sir," said the President, "what have you to communicate?" "Good night, Mr. President." (Continued laughter.) "Order, order, all attention."

We believe that the gentleman's imagination had bodied forth something; but, in rising, it had vanished into thin air, and he again sat down amidst the loud applause of the whole class. "Mr. President! are more than six allowed to speak at once!" Fie! fie! shame! shame!

"Really, gentlemen, I cannot go on with this very *important business*; and you know The Lancet will have the laugh against us." Bravo!

To conclude, one gentleman observed, that he *wished all the lights to be put out*, as he did not wish to take notes; he could read the lecture afterwards in The Lancet; but he came to *see* Mr. Abernethy lecture." How clever!—What, see Mr. Abernethy in the dark! this is like *seeing* the *invisible spy*. How did this *very important business end*? Why, by consenting to appoint a committee, not of *sixteen* or *twelve*, as before proposed, but of *six* gentlemen as inspectors, and to allow the lights to remain. Were the *six* gentlemen all ready and willing to come forward to fill so honourable an office? Oh no; hang it, hang it! Only one could be found after repeated appeals; and the meeting dispersed in great disorder, and all the projects evaporated *in fumo*. What noble advocates of darkness are such children of ignorance!

THE FARCE

Of Monday was repeated on Wednesday night, when the chief actor, "*Tom Fool*," was admirably played by a Mr. SKEY; he sustained the part with great consistency, and contributed essentially to the entertainment of the evening.

Previous to the Lecture, the demand for lights became very general, and a lamp was brought; this excited much displeasure with the opposite party, and a yell, as frightful as the war-whoop of the American Indians, was raised.

In the midst of this tumult Mr. ABERNETHY appeared, who was evidently much displeased with the proceedings, and expressed himself to the following effect:—

"THIS DISTURBANCE IS VERY ANNOYING TO ME AND TO OTHERS; you should recollect that you are now within the precincts of the Hospital, and that such vociferations and uproar are far from being justifiable. *I must beg of you, therefore, to discontinue such* ABSURD AND RIDICULOUS PRACTICES." A gentleman with the lamp in his hand said, that as it was Mr. ABERNETHY'S wish that the lamps should be lighted, it would be folly to remain in the dark. The clock at this moment struck seven, and Mr. ABERNETHY began his Lecture.

After the Lecture, the self-elected Mr. SKEY made his appearance, and seated himself in the chair. With wonderful sagacity he informed the class, that "the former meeting had fallen to the ground, principally owing to the absence of *Peace*, but that it was *an article* very *necessary* to carry on *any debate!!*" (Laughter.) To repeat every foolish thing which Mr. SKEY said in the course of the evening would occupy more of our paper than we are willing to devote to such a coxcomb. There were many pertinent remarks made which hurt this worthy gentleman's consequence very much. He went out of the theatre like a knight of the rueful countenance; he came expecting a splendid victory, but he experienced a total defeat.

The business of the meeting closed by proposing that a deputation of *Six* of the oldest pupils should wait upon Mr. ABERNETHY, to request him to publish his lectures, and that this deputation should also wait on the other schools, to *inoculate them* (as Mr. SKEY said) with the same feeling which they possessed!! The only point we have next to notice, is the readiness with which these six champions came forward to fill the "*honourable office*" designed for them. Who were they? Six of the most intelligent, noble-minded fellows in existence, no doubt, appointed immediately; volunteers worthy of knighthood!

Mr. BRAMLEY!

Mr. CHAPMAN!!

Well, but you cannot call these *six*; very true,—but if you cannot get six, you must be content with *two*. Two others were proposed, but they declined accepting of this "*honourable office*."

The meeting broke up in the greatest confusion, to the no small chagrin of those wiseacres, SKEY, BRAMLEY, and CHAPMAN.

REVIEW.

Original Cases, with Dissections and Observations, illustrating the Use of the STETHOSCOPE *and* PERCUSSION *in the Diagnosis of the Diseases of the*

Chest: together with a Translation of AVENBRUGGER's *Treatise, and* CORVISART's *Commentaries, &c.* By JOHN FORBES, M.D. Physician to the Chichester Dispensary. Underwood, London, 1824.

THE author of the work before us is not unknown in the literary world. Besides several valuable communications which have appeared in the periodical publications from his pen, Dr. FORBES, about three years ago, translated into English the celebrated work of M. LAENNEC *sur l'Ascultation Mediate.* In this work is contained one of the most valuable discoveries with which modern medicine has been enriched,—an instrument for detecting the various diseases of the chest. The manner in which it should be used, the different sounds obtained in different diseases, and the indications afforded by those sounds, are stated with a degree of precision which could only have been acquired by the most accurate observation and persevering industry. The value of M. LAENNEC's discovery has been confirmed by all who have taken the pains to investigate its merits; and most of the statements in his own work are verified by numerous *post mortem* examinations. The idea of the stethoscope was first suggested to LAENNEC by the sounds afforded by percussion. Percussion and auscultation, therefore, are intimately connected; the one having given rise to the other. Percussion was first introduced into practice by LEOPOLD AVENBRUGGER, a native of Graets, in Styria. In 1761 he published a work on the subject, entitled, *Inventum Novum ex Percussione thoracis humani ut signo abstrusos interni pectoris morbos detegendi;* and concerning its usefulness he makes the following observations: "Expertus affirmo, quod signum, de quo hic agitur, gravissimi momenti sit non tantum in cognoscendis, sed etiam curandis morbis: atque ideo primum locum mereatur post explorationem pulsus et respirationis. Enim vero in quocumque morbo præternaturalis sonus thoracis observatus fuerit, majus subesse periculum indicabit semper." (*Tr.*) I state from experience, that the sign here treated of is of the utmost importance, not only in discovering, but curing diseases; and thus deserves to be ranked next after the invertion of the pulse and respiration. For indeed, in whatever disease the preternatural sound of the chest is observed, it will be the indication of considerable danger.

Notwithstanding the assistance which percussion affords in detecting the presence of disease in the chest, it was tried but little in Germany when the original work was published. In 1770, AVENBRUGGER's treatise was translated into French by ROZIERE, but it was not till 1788 that it began to be tried in France, when CORVISART first introduced it into practice. "After twenty years' experience," says Dr. FORBES, "this distinguished physician finally established the practice on a firm and lasting foundation, by means of his translation of, and admirable commentary on, the neglected original treatise of AVENBRUGGER. CORVISART's work was published in 1808, and by means of it, and through the example and lectures of this great man, the practice became extensively diffused over France; and for many years past it has been considered by every intelligent practitioner, more especially in Paris, as a common, and

indeed indispensable measure in studying diseases of the chest. To AVENBRUGGER alone belongs, unquestionably, the honour of the discovery of percussion; but it is to its reviver and second founder, CORVISART, that it is almost entirely indebted for the present rank and estimation which it has obtained." Preface, p. xii.

In this country, we need scarcely mention, that percussion has been entirely neglected, and we therefore think Dr. FORBES entitled to the thanks of the profession, for having given in an English form the treatise of AVENBRUGGER, together with the commentaries of CORVISART. AVENBRUGGER's treatise is written in the form of axioms and scholia; the axiom being stated, the scholium or observation on the axiom follows; and in CORVISART's translation, his commentary on both axiom and scholium comes after those two. Dr. FORBES has preserved this plan, although no powerful reasons on its behalf are stated; whilst we are sure that any one with Dr. F.'s talents might have remoulded the whole, and at the same time preserved the matter of both AVENBRUGGER and CORVISART; when professional men would be induced to read a performance which, in its present shape, we fear, will only be perused by those who are well convinced of its intrinsic merit. The great value of percussion, however, as a diagnostic measure, is in conjunction with the important discovery of LAENNEC. Combine percussion and auscultation, and the assistance of them both, with care and attention, will soon enable a medical man to acquire a certainty in the diagnosis of the diseases of the chest, which cannot be acquired by any other means, however studiously cultivated. CORVISART bears testimony to the value of percussion in the following words: "Pour moi, convaincu d'apres une experience répétée, depuis plus de vingt ans, non pas seulement de l'utilité, mais de l'indispensable necessité, de la percussion du thorax dans un très grand nombre d'affections aiguës et chroniques, je ne puis croire qu'on neglige à l'avenir un moyen si precieux, et j'ai la conscience, qu'en publiant, à cet egard, mes observations, j'enrichis l'art de connaissances positives; je rend hommage au travail trop oublié d'un medecin estimable, et je pense que les hommes qui cultivent avec zèle la medecine, entireront un parti fort avantageux pour le bien de l'humanité." LAENNEC speaks of it in the following terms:—"La percussion de la poitrine est, sans contredit, l'une des decouvertes les plus precieuses dont la medecine se soit jamais enrichie. Elle a soumis au jugement immédiat des sens, plusieurs maladies que l'on ne reconnaissait jusque là qu'à des signes généraux et equivoques, et en a rendu le diagnostic aussi sur que facile."

These observations, in our next Number, we will prove by facts; we will only at present recommend to the serious attention of every practitioner, and those students who have time, both percussion and auscultation. To understand them well, they will require to be studied with great assiduity and perseverance; but without labour, of some sort or other, nothing valuable in medicine can be justly acquired. In the following pages we have given a condensed account of percussion, as described by AVENBRUGGER, leaving out some of his descriptions of disease, which, considering the time in which he

wrote (1760), and that he was a follower of the humoral pathology, cannot be so good as those to be found in later writers. We have also given, from Dr. FORBES' work, an outline of the method of distinguishing diseases of the chest by means of the stethoscope, extracted from the original treatise of M. LAENNEC, published in 1819. By this means our readers will be able to judge of the merits of percussion and auscultation; and we shall be glad if, in any way, we contribute to make known the value of those discoveries, which, if attentively studied, must confer lasting benefit on medical science.

Percussion, and the Natural sound of the Chest.

Percussion consists in striking the chest slowly and gently with the fingers brought close together, but in an extended position. This method is founded on the property possessed by the human thorax, in common with most hollow bodies, of giving out certain sounds when struck in a particular manner. The sound thus elicited from the healthy chest resembles the stifled sound of a drum, covered with a thick woollen cloth or other envelope. The sound is perceptible in different parts of the chest in the following manner: on the right side, anteriorly, it is observable from the clavicle to the sixth true rib; laterally, from the axilla to the seventh rib; and posteriorly, from the scapula to the second and third false ribs. The left side yields this sound from the clavicle to the fourth true rib, anteriorly; posteriorly and laterally, the same as on the right; in the region of the heart, the sound loses its clearness and becomes dull. In fat persons, the sound obtained by percussion is always duller than the sound in lean persons. During the trial of percussion, the patient is, first, to go on breathing in the natural manner, and then to hold his breath, after a full inspiration. During inspiration and retention of the breath the sound is every where louder; and the reverse during expiration. On whatever part of the chest percussion is performed, the patient should be so situated as to render the parietes tense; as for instance, if the back is the part to be struck, the patient should bend himself forward; if, on the contrary, it is the chest, the head should be held erect, and the shoulders thrown back. In order to obtain an accurate knowledge of the sounds afforded by percussion, a person should first try it on the healthy chests of individuals of different degrees of stoutness, as the sound is generally clear in proportion to the leanness of the person.

Of the Morbid sound of the Chest.

A clear and equal sound, elicited from both sides of the chest, indicates that the air cells of the lungs are free and uncompressed either by a solid or liquid body; but if the sound be not the same on both sides, a morbid condition of some of the parts within the chest is indicated. If a place, naturally sonorous, sounds only as a piece of flesh when struck, and still retains the same sound when the breath is held after a deep inspiration, we are to conclude that the disease extends deep into the cavity of the chest. If the same results are obtained both before and behind, on points precisely opposite, we may determine that the disease occupies the whole diameter of the chest. To ascertain whether the obstructing body is solid or fluid,

the patient should be put both in the erect and horizontal positions, during the trial of percussion. In this case, if the obstructing cause is a fluid, it will be found to vary its level with corresponding variation of sound according to the laws of hydrostatics; if it is a solid, the same results will be obtained in every position. This, however, will not hold good when the cavity of the chest is quite full of fluid, nor in those cases of chronic pleurisy where the fluid is confined by false membranes. It is only applicable to cases of simple hydrothorax.

Of the Diseases in which the Morbid sound of the Chest is observed.

The preternatural, or morbid sound occurs in acute and chronic diseases, and always accompanies a copious effusion of fluid into the chest. AVENBRUGGER, in his original work, has omitted to state the acute diseases in which the morbid sound is heard, but CORVISART, in his Commentaries, has supplied this deficiency.

Acute Diseases.

In peripneumony, and pleuro-peripneumony, if the inflammation is acute, the morbid sound is perceptible on the second, third, or fourth day at farthest; the natural sound gradually lessens, and is entirely lost by the sixth or seventh day, if the disease is to terminate fatally. On the other hand, it gradually re-appears, if recovery takes place. The preternatural sound, which is perceived during the course of acute diseases of the chest, occurs most frequently in inflammatory affections. The time at which the sound may be detected varies according to the rapidity and severity of the complaint; it is generally perceptible about the fourth day. From extensive observation, AVENBRUGGER has drawn the following corollaries respecting the sound in inflammatory affections of the chest:

1. The duller the sound, and the more nearly approaching that of a fleshy limb stricken, the more severe is the disease.

2. The more extensive the space over which the morbid sound is perceived, the more certain is the danger from the disease.

3. The disease is more dangerous on the left than on the right side, arising from the vicinity of the pericardium and the heart to the former.

4. The existence of the morbid sound on the superior and anterior part of the chest (i. e. from the clavicle to the fourth rib) indicates less danger than on the inferior parts of the chest.

5. The want of the natural sound behind indicates more danger than it does on the anterior and superior parts of the chest.

6. The total want of sound over one whole side is generally a fatal sign.

7. The absence of sound along the course of the sternum is a fatal sign.

8. The entire absence of the natural sound over a large space, in the region of the heart, is a fatal sign.

AVENBRUGGER, in his scholium on these deductions, says:

"Observavi quandoque fatales prædictiones ad numerum sextum et septimum falsas fuisse tunc, quando natura simile congestum ad peripheriam thoracis, vel ad alias corporis partes minus principales, formando abscessus, ablegavit."

"Accedit, quod prudens vete-

rum audacia (quæ affectam plagam aut secare, aut urere tentavit) naturæ medicantis methodum felicissimo cum successu sæpe imitata sit.* Inventum Novum, p. 39.

Translation. — I have sometimes observed that the fatal predictions given in the corollaries 6 and 7 were not verified, when nature relieved the congestion by the discharge of the matter outwards, or the formation of abscesses in parts less essential to life.

The ancients, with a becoming fortitude, imitated this effort of nature with the most complete success, by cauterising or incising the affected part.

Chronic Diseases.

The preternatural sound observed in chronic diseases is owing either—1, to some latent disease which attacks the viscera of the chest, gradually disorganizing and finally, destroying them, or, 2, to some apparent causes which induce a slow disorganization of their structure. The diseases of the first class are those which depend on the hereditary predisposition; 2. affections of the mind; and, 3, those which attack artisans whose lungs are weak. In cases of chronic disease, where the morbid sound occurs, if there be much emaciation and debility, the case is always desperate, and the result inevitable when the disease does not yield to medicine. In such cases we may always conclude, that the lung of the side which yields the preternatural sound is either compressed by some foreign body, or indurated by disease, or destroyed by some morbid acrimony developed within its own structure.

* Vide Boerhavii Commentaria, 893. 1190.

Of the preternatural sound of the Chest, which results from copious extravasation of the Fluids contained in the vessels of that cavity.

The fluids contained in the vessels of the chest are, 1. Chyle; 2. Blood; 3. Serum and Lymph. Avenbrugger, in reference to the extravasation of chyle, says, that he never saw an instance in which it had taken place, but thinks its occurrence very possible, and that the same causes which produce erosion and perforation of the thoracic parietes, may also produce it. The extravasation of these fluids may arise from the following causes: 1. Rupture of the containing vessels; 2. Too great tenuity of the contained fluids; 3. Non-absorption of the same, &c.; 4. Relaxed and debilitated state of the vessels; 5. Obstructions originating in a bad habit of body. When from these causes the fluids mentioned are poured out in considerable quantity, the preternatural sound will exist over the space occupied by them.

Of those affections of the Chest which are not indicated by percussion.

In reference to this division of the subject, Corvisart says, that the title is not correct, since, by the testimony of Avenbrugger himself, many of the diseases mentioned have their seat, not in the chest, but in the abdomen, the affection of the lungs being merely sympathetic. Nevertheless, percussion is still very useful even in these: in the first instance, it shows the integrity of the thorax, and directs the attention to other parts; secondly, it detects the presence of organic disease in this cavity, should this arise in the

course of the affection; in every period of the disease, continues CORVISART, it will assist the physician in his diagnosis, prognosis, and treatment. In those cases where the symptoms of thoracic disease are merely symptomatic, the morbid sound will not be heard.

Of the appearances on Dissection, in cases where the preternatural sound of the Chest had been observed.

The diseases in which these appearances are noticed, are the following:—

1. Scirrhus of the lungs.
2. Conversion of this into an ichorous vomica.
3. A purulent vomica, closed or ruptured, in the pleura, lungs, mediastinum, or pericardium.
4. Empyema.
5. Dropsy of the chest in one or both cavities.
6. Dropsy of the pericardium.
7. Extensive extravasation of blood in the cavity of the pleura, or pericardium.
8. Aneurism of the heart.

Scirrhus of the Lungs.

AVENBRUGGER thus defines scirrhus of the lungs, "Scirrhum pulmonis tunc adesse dico, quando spongiosa pulmonis substantia in carniformem et indolentem massam degeneravit."—P. 61. Inventum Novum. *(Trans.)* I say that scirrhus of the lungs exists, when the spongy texture of the lungs has degenerated into an indolent fleshy mass.

CORVISART, in reference to this description of scirrhus, makes the following observations in his commentaries on AVENBRUGGER's treatise; he says, "although we may offer objections to the name used by our author, we must admit the existence of the disease thereby designated. I am ignorant of the precise nature of this affection. I think it is generally formed slowly and insensibly, as in the case of artisans exposed to a dusty atmosphere. Perhaps, also, it may originate spontaneously, and be the result of a very slow latent peripneumony. The term *carnification*, applied to this affection, is incorrect, inasmuch as the character of the lung is not at all like muscle, but like the liver; on this last account, the term *hepatization* is much more correct and appropriate. In this variety of morbid structure, what becomes of the blood vessels, bronchia, vesicles, glands, and nerves of the pulmonary organs?" A portion of sound lung swims, but when in a state of hepatization it sinks. The existence of scirrhus, before it has proceeded to the state of softening, may be suspected from the following signs: In addition to the decrease or entire loss of the natural sound over the affected part, there is an occasional cough without any expectoration, or with only a scanty excretion of viscid and crude sputa. During a state of quiescence nothing unusual presents itself, either in the state of the pulse or respiration; but, upon any considerable bodily motion, the patients become speedily exhausted, then anxious, breathless, and complain of a sense of dryness and roughness in the throat. At the same time, the pulse, which has previously been of moderate frequency, becomes quick and unequal; the respiration and speech are broken and interrupted by sighs; the temporal, sublingual, and jugular veins of the side affected are distended more than natural, while, during inspiration, this side of the chest will be observed to move less than the other. In this

state the natural and animal functions continue to be well performed, and the patient can lie on either side indifferently. These symptoms will vary in proportion as the scirrhus is extensive. As the disease advances, there will be gradual emaciation, a feeling of oppression and weight, without absolute pain in the affected side, and then it frequently happens that the disease suddenly terminates the life of the patient. Some time before death, however, the appetite gradually fails, the sleep is lost, the patient is extremely anxious, and, towards the close of his existence, has partial sweats on the breast and neck, sometimes warm, more frequently cold, and which are followed by fainting. Before dissolution, the pulse becomes small, unequal, and intermittent, and the patient can only lie on the side affected.

We have given every thing contained in AVENBRUGGER's treatise respecting percussion, and the sounds afforded by it in health and disease. The remainder of his work is occupied with descriptions of the diseases enumerated above; but as later writers, such as CORVISART, LAENNEC, and others, have written on these subjects more at length, we shall now proceed to give our readers an outline of auscultation mediate, or an account of the application of the stethoscope to the discovery of the diseases of the chest a: l heart.

On Mediate Auscultation.

"*Mediate Auscultation* is founded on the well-known property of the air, to transmit sound with much greater readiness when assisted by solid bodies. In the present case, this property is applied to the discovery of the sounds produced in the interior of the chest, by the natural motions of the organs of circulation and respiration. From the modification of these sounds, in health and disease, a judgment is formed respecting the actual state of the organs.

The instrument used for this purpose is called the Stethoscope. This consists simply of a cylinder of wood, a foot in length, perforated in its centre longitudinally by a bore of three lines in diameter, and formed so as to come apart in the middle, for the purpose of being more easily carried. One extremity of the cylinder is hollowed out into the form of a funnel, to the depth of an inch and a half, which cavity can be obliterated at pleasure by a piece of wood so constructed as to fit it exactly, with the exception of the central bore, which is continued through it, so as to render the instrument, in all cases, a pervious tube. The complete instrument, that is, with the funnel-shaped plug infixed, is used in exploring the voice, the signs obtained through the medium of the voice, and the action of the heart; the other modification, or with the stopper removed, is for examining the sounds communicated by respiration. A solid cylinder, without any perforation, is the best instrument for exploring the heart; but, as this form is not so good for examining the voice and respiration, the perforated cylinder is commonly used for all purposes. On all occasions, the cylinder should be held in the manner of a pen, and the hand of the observer should be placed very close to the body of the patient to ensure the correct application of the instrument.

The end which is applied to the patient, that, namely, which con-

tains the stopper, or plug, ought to be slightly concave, to ensure its greater stability in application; and, when there is much emaciation, it is sometimes necessary to insert between the ribs a piece of hat or cotton, or a leaf of paper, on which the instrument is to be placed; as, otherwise, the results might be affected by the imperfect application of the cylinder. The same precaution is necessary in the examination of the circulation, in cases where the sternum, at its lower extremity, is drawn backwards, as frequently happens with shoemakers and other artisans.

There are three kinds of exploration by the stethoscope; viz., that of the voice, the respiration, and the circulation.

I. The Voice. When a person in health speaks or sings, his voice excites in the whole parietes of the chest a sort of vibration, which is easily perceived on applying the hand to the thorax. This phenomenon is no longer observable when, through disease, the lungs have ceased to be permeable to the air, or are removed from the contact of the parietes of the chest by an effused fluid. This sign is of inferior value, since a great many causes occasion varieties in the intensity of the vibration, or completely destroy it. For instance, it is little sensible in fat persons, in those whose integuments are considerably flaccid, and in those who have a sharp and weak voice. Anasarca of the chest completely destroys it, even when the lungs are quite sound. In any case, it is only very perceptible at the anterior and superior part of the chest, on the sides, and in the middle of the back. From these and other causes we can derive little practical benefit from attending to this particular circumstance.

On making use of the cylinder, with the view of further investigating this phenomenon, it was found, as, indeed, might have been expected, that it conveyed the peculiar sound much less distinctly than the bare hand. It was also ascertained that the degree of intensity of the vibration varied in different points of the thorax. The places where it is more distinct are the axilla, the back, between the spine and the edge of the scapula, and on the anterior and superior part of the chest, near the angle formed by the union of the clavicle with the sternum. When we apply the cylinder to these points, the voice appears stronger and nearer to us; in the others, on the contrary, particularly in the inferior and posterior parts of the chest, it seems weaker and more remote.

The only diseases, to the diagnosis of which the exploration of the voice has been applied with success, are phthisis pulmonalis, pleurisy, and pneumo thorax.

If we apply the stethoscope to the larynx or trachea of a person in health, when speaking, we hear the voice of the individual as if coming directly from the point on which the instrument rests, and reaching our ear through the canal in it. In the second stage of phthisis, when tubercular excavations exist in the lungs, if the stethoscope be applied to the chest, over the site of one of these, the same transmission of voice through the tube is perceived. This phenomenon has been named *pectoriloquism*; it is the pathognomonic sign of the morbid state just mentioned.

In cases of pleurisy, with effusion of serous fluid, there is a partial transmission of the voice, somewhat resembling pectoriloquism, yet peculiarly modified, so as to

be easily distinguished from it: this is named *hægophonism*, from a supposed resemblance that it bears to the voice of a goat.

In certain cases of tubercular phthisis, and in that particular variety of pneumo thorax, where the accompanying empyema communicates with the bronchia by means of a fistulous opening, the exploration of the voice conveys to the ear a peculiar sound, which bears a striking resemblance to that emitted by a cup of metal, glass, or porcelain, when gently struck with a pin, or into which a grain of sand is dropped. This sound has been named *metallic tinkling*, and is considered pathognomonic of the triple lesion abovementioned.

II. Respiration.—On applying the cylinder, with its funnel-shaped cavity open, to the breast of a healthy person, we hear, during inspiration and expiration, a slight, but extremely distinct, sound, answering to the entrance of air into, and its expulsion from, the air-cells of the lungs. This sound may be compared to that produced by a pair of bellows, whose valve makes no noise,—or, still better, to that emitted by a person in a deep and placid sleep, who takes, every now and then, a deep inspiration. We perceive this sound almost equally distinct in every part of the chest, but more particularly in those points where the lungs, in their dilatation, approach nearest to the thoracic parietes: as, for instance, the anterior superior, the lateral, and the posterior inferior regions. The hollow of the axilla, and the space between the clavicle and superior edge of the trapezius muscle, exhibit the phenomenon in its greatest intensity. It is equally perceptible on the larynx, on the exposed or cervical portion of the trachea, and, in many persons, throughout the whole tract of this canal, to the bottom of the sternum; but on the trachea, and, in some degree at the root of the bronchia, the respiratory sound has a peculiar character, which evidently indicates the transmission of the air through a larger space than the air-cells. In this position, also, it often seems as if the patient, during inspiration, inhales the air through the tube of the stethoscope, and expels it by the same during expiration.

To judge correctly of the state of respiration by this method, we must not rely on the results of the first moments of examination. The sort of buzzing sensation often caused by the first application of the instrument, the fear, restraint, and agitation of the patient, which mechanically lessen the force of respiration, the frequently inconvenient posture of the patient or observer, and the great sensation occasionally produced by the action of the heart, are all causes which may at first prevent us from correctly appreciating, or even from hearing at all the sound of inspiration and expiration. We must, therefore, allow some seconds to elapse before we attempt to form an opinion.

It need hardly be observed, that there must be no noise whatever in the vicinity of the patient. The intervention of clothing, even when of considerable thickness, does not greatly diminish the sound of respiration; but we must be careful that there is no friction between this and the instrument, as this circumstance, especially if the clothes are of silk, or of a fine hard stuff, may mislead us, by exciting a sensation analogous to that produced by respiration. Fatness, even when excessive, and anasarca of the chest, seem to have no marked

effect in diminishing the peculiar sound. The sound is distinct in proportion to the frequency of respiration. A deep inspiration, made very slowly, will sometimes be scarcely audible; while an imperfect inspiration, such as hardly elevates the chest, provided it be made quickly, may produce a very loud sound. On this account, when examining a patient, more especially if we have but slight practice with the instrument, we should desire the respiration to be performed rather quickly. This is, however, a very unnecessary precaution in most diseases of the chest, as the frequent presence of dyspnœa necessarily renders the respiration quick. The same applies to fever, and the agitation caused by nervous affections.

Many other causes, and particularly the age of the individual, alter the intensity of the sound. In children, respiration is very sonorous, even noisy, and can be heard easily through very thick clothing. In them, the close and forcible application of the instrument, to prevent the friction of the garment, is unnecessary; as any noise that might arise from this cause is lost in the intensity of the other. The respiration of children differs, also, from that of adults in other repects besides its intensity. It is impossible to describe this peculiarity, but it will be easily understood by comparative trials. It appears as if, in children, we could distinctly hear the dilatation of all the air-cells to their full extent; whilst, in adults, these seem as if, from their stiffness, they could only bear a partial dilatation. This difference of sound is much less marked in expiration than inspiration. The dilatation of the chest in inspiration is also greater in the child, and both these peculiarities are more remarkable as the child is young; they continue in a greater or less degree to the period of puberty, or a little beyond it.

The sound produced by respiration varies also very much in its intensity in different adults. In some men it is scarcely perceptible, unless they make a very deep inspiration, and even then, although sufficiently distinct, it is not one half so audible as in the majority of persons. These individuals have generally a rather slow respiration, and are little subject to dypsnœa, or breathlessness, from any cause. Others, however, have the respiration very sensible, even during a common inspiration, without being, on this account, at all more subject to shortness of breath than the former. Some few individuals, again, preserve, through life, a state of respiration resembling that of children, and which is, therefore, denominated *puerile*, in whatever age it may be perceptible. An adult cannot, by any effort, give to his respiration the sonorous character of childhood; but in some morbid states the respiration spontaneously acquires it, without being at the time performed more forcibly than usual. This is particularly the case when one whole lung, or a considerable portion of both lungs, is rendered impenetrable to air through disease, especially acute disease. In the sound portion of the lungs, in these cases, the respiration is perfectly similar to that of children. The same thing is observable throughout the whole extent of the lungs in some cases of fever, and in certain nervous disorders.

When we can distinctly perceive, and with a uniform intensity, the respiratory murmur in every part of the chest, we may be as-

sured that there neither exists effusion into the cavity of the pleura, nor any species of engorgement in the substance of the lungs. On the other hand, when we find the respiration is not to be distinguished in any particular point, we may safely conclude that the corresponding portion of the lungs within is become impermeable to the air from some cause or other. This sign is as easy to be perceived as the presence or absence of the sound in the percussion of AVENBRUGGER, and affords precisely the same indications. With the exception of some peculiar cases, in which the simultaneous employment of the two different methods gives us signs which are completely pathognomonic, we may state it as a general fact, that the absence of the sound, on percussion, uniformly corresponds to the absence of respiration, as ascertained by the stethoscope. Accordingly, this failure of respiration, existing in a greater or less degree, and over a greater or less extent of surface, is found to be a principal distinctive sign of PERIPNEUMONY, PLEURISY, HYDROTHORAX, and all other diseases which, in any other way, obstruct or impede the natural action of the lungs.

The natural sound of respiration is further modified by being combined with other sounds in certain morbid states of the lungs. These various modifications have been denominated the *Rattle*, and consist of four principal varieties.

I. The *Crepitous Rattle*. This bears some resemblance to the crepitation of salt in a heated vessel, or to the sound emitted by a healthy lung when compressed in the hand, only stronger. This variety is the pathognomonic sign of peripneumony, in the first degree; it exists also in œdema of the lungs, and sometimes in hæmoptysis.

II. The *Mucous Rattle*, the *Dead Rattles* of the vulgar, is the extreme degree of this variety. It is produced by the transmission of the breath through fluids accumulated in the trachea or bronchia. It furnishes important indications in pulmonary catarrhs, phthisis pulmonalis, hæmoptysis, &c.

III. The *Sonorous Rattle*. This is more variable in its character than the former species. In this the sound, more or less deep, is sometimes extremely loud, resembling, at different periods, the snoring of a person asleep, the last notes of a musical instrument, or the cooing of a wood-pigeon. This variety is of inferior value as a diagnostic; it is usually produced by the partial obstruction or narrowing of a bronchial tube.

IV. The *Sibilous Rattle*. This is also varied in its character. Sometimes it is like a prolonged whisper, or various intonations; sometimes it is very momentary, and resembles the chirping of birds, the sound emitted by suddenly separating two portions of smoothed oil-stone, or by the motion of a small valve. These different kinds often exist together in different parts of the lungs, or successively in the same part. The peculiar nature of the sound, and the appearances on dissection, prove the sibilous rattle to be owing to minute portions of very viscid mucus obstructing more or less completely the small bronchial ramifications.

III. THE CIRCULATION. The action of the heart, as explored by the stethoscope, is studied under three different relations; viz. of the Sound, Impulse, and Rhythm.

I. *Of the Sound*. The alter-

nate contraction of the different parts of the heart produces a peculiar sound, of which the individual is himself sometimes sensible, during palpitation and in fever. In certain states of disease, it can be heard at some distance from the patient, but this is a very rare case.

In ordinary cases, the stethoscope, applied between the cartilages of the fifth and sixth ribs at the end of the sternum, &c., conveys to the ear a distinct sound, even when the pulse is very feeble, or imperceptible. This, in the healthy body is double, and each beat of the arterial pulse corresponds to this double sound, in other words, to two sounds. One of these is clear and rapid, and somewhat resembles the sound produced by the valve of a pair of bellows: this corresponds to the systole of the auricles. The other is more dull and prolonged, coinciding with the beat of the pulse, and with the shock or impulse communicated to the parietes of the chest by the motion of the heart: it indicates the contraction of the ventricles. The sounds heard at the end of the sternum are produced by the action of the heart; those between the cartilages of the ribs, by the left cavities. In the state of health, the sound produced by the contraction of each side is the same.

The sound is the only phenomenon connected with the motion of the heart, usually observable in any other part of the chest besides the præcordial, the impulse of its action being confined to that part.

The sound produced by the action of the heart is great in proportion as the parietes of the ventricles are thin and their impulse feeble: consequently, it cannot be attributed to the percussion of this organ against the side. In a moderate degree of hypertrophia, the contraction of the ventricles yields only a dull sound, like the murmur of inspiration, and the auricle, in like manner, a much less noise than in the natural state. In a high degree of hypertrophia, the contraction of the ventricles produces merely a shock, without any sound, and the sound of the auricles is scarcely audible. On the other hand, when the ventricular parietes are thin, the noise produced by the contraction is clear and loud, approaching to that of the ventricles; and, if there be a marked dilatation of the ventricles, the sound becomes very similar to, and almost as strong as, that of the auricles.

In the state of health, the sound of the contractions of the heart is no where heard so strongly as in the cardiac region: in certain states of disease, it may be heard more distinctly in other places.

The softening of the substance of the heart deadens the sound of its contractions; as does also any impediment of the circulation, whether caused by too much blood, or by an obstacle in the auriculo-ventricular orifice. This latter state further gives rise to a dull rustling, very like the noise of a bellows, or, when stronger, like that produced by the action of a file on wood. The particular orifice affected is, in this case, indicated by the place and time in which the sound is observed. When the orifice is on the left side, we can sometimes feel with the hand a sort of vibratory sensation, like that produced by the purring of a cat. In this case, the noise produced by the contraction of the cavity having the

obstructed orifice is not only duller, but much more prolonged than in the natural state; insomuch that the contraction of the auricles is sometimes three or four times slower than that of the ventricles, if the obstruction is the auriculo-ventricular orifice. This phenomenon may be somewhat diminished in intensity by bleeding, &c.; but cannot be altogether removed.

In a healthy person of moderate fullness, and whose heart is well-proportioned, the sound of this organ is only perceived in the cardiac region, that is, in the space comprised between the cartilages of the fifth and seventh ribs, and under the lower end of the sternum. In thin persons, in the narrow-chested, and also in children, the sound is more extended; being perceptible over the lower third, or even three-fourths of the sternum, and sometimes even over the whole of this bone: also at the superior part of the left side, as high as the clavicle, and sometimes, though feebly, under the right clavicle. When the sounds are confined to the places abovementioned in subjects of the kind noticed, and when they are much weaker below the clavicles than in the region of the heart, we may conclude, that the viscus is well-proportioned.

When the sound of the heart becomes more extended, it is heard successively in the following places,—1st. The whole left side of the chest, from the axilla to the stomach—2nd. The whole of the right side—3rd. The posterior part of the left side of the chest; and 4th. The posterior part of the right side. This last is rare. In these cases, the intensity of the sound is progressively less in the succession mentioned.

When the pulsation of the heart is heard over a greater extent than what is above stated to be the range of sound of a well proportioned organ, the individual rarely enjoys good health. If he has not formal dyspnœa, he has, at least, shorter respiration than usual, is put more easily out of breath, and is more subject to palpitation. This state, however, which is that of many asthmatics, may remain stationary many years, and does not always prevent the attainment of an advanced age.

It may be taken as a general fact, that the extent of the sound is in the direct ratio of the thinness and weakness of the heart, and consequently inversely as to its thickness and strength. The size of the organ must also be considered as affecting the extent of the sound.

When the sound extends over all the places above mentioned, we may presume that the heart is increased beyond its natural size, and that this increase is owing to the dilatation of one or both ventricles. This presumption will be strengthened, if the sound is as great under the clavicle, or in the axilla, as in the region of the heart. If it is perceived neither in the back nor right side, but only in the other points mentioned, and if its intensity is nearly equal in all these, we may conclude that the ventricles are moderately dilated, and that the parietes of the heart are naturally thin. On the contrary, when there is a very strong impulse in the region of the heart, and very little or no sound under the clavicle, we may be assured (if the patient has other general symptoms of diseased heart) that the disease is hypertrophia of the ventricles; while, if he has never

experienced any marked disorder of the circulatory organs, we may be certain, that the parietes of the left ventricle, although very thick and firm, are still not sufficiently so to constitute disease. In these cases, of course, a decided opinion will not be formed without considering all the other circumstances.

II. *Of the Impulse.* The degree of impulse communicated by the cylinder to the ear, is, in general, inversely as to the extent of the pulsation of the heart, and directly as the thickness of the walls of the ventricles. In a person whose organs of circulation are well proportioned, this impulse is very little perceptible, often quite imperceptible, especially if the individual is rather fat. When the parietes of the heart are unnaturally thick, the impulse is usually so great as very sensibly to elevate the head of the observer, and sometimes to give a disagreeable shock to the ear. The more intense the hypertrophia, the longer time the impulse is perceptible. When the disease exists in a high degree, we feel as if the heart, in dilating, first comes in contact with the thoracic parietes in one point only, and then with its whole surface, and that it contracts and falls back all at once. The impulse of the heart is only felt during the systole of the ventricles, or if, in some rare cases, an analogous phenomenon accompanies the contraction of the auricles, this is easily distinguished from the former. In fact, when the systole of the auricles is attended by any sensible impulse, this is perceived to have its seat much deeper, and most commonly it consists merely of a sort of vibration. In any case, it is very little marked, as compared with the sensation produced by the contraction of the ventricles, when these are of a good degree of thickness.

When the parietes of the heart are thinner than usual, no impulse is communicated, even when the sound is greatest; and in this case the alternate contraction of its cavities is only distinguished by the sound these produce. A strong impulse, therefore, must be regarded as the chief sign of hypertrophia, and the absence of all impulse as the characteristic of dilatation of the heart.

The impulse of the heart's action is usually perceptible only over the region of the heart, or, at most, over the inferior half of the sternum. When very great, it extends to the epigastrium, in cases where the sternum is short. In simple hypertrophia, it is usually perceived in no other part; but when this is conjoined with a certain degree of dilatation, it is sometimes distinctly perceived under the clavicles, and in the right side of the chest. The impulse of the heart's action is, of course, diminished by whatever debilitates the general strength of the system.

Of the Rhythm.—By this term is meant the order of the contractions of the different parts of the heart, and the relative succession and duration of these, as perceived by means of the stethoscope. In a healthy and well-proportioned heart, these are as follows:—

At the moment of the arterial pulse, the ear is slightly elevated by an isochronous motion of the heart, which is accompanied by a somewhat dull, though distinct sound. This is the contraction of the ventricles. Immediately after, and without any interval, a noise resembling that of a valve, or a whip, or the lapping of a dog, an-

nounces the contraction of the auricles. This noise is accompanied by no motion perceptible by the ear, and is separated by no interval of repose from the duller sound and motion indicative of the contraction of the ventricles, which it seems, as it were, to interrupt abruptly. The duration of this sound, and consequently the period of contraction of the auricles is less than that of the ventricles. Immediately after the systole of the auricles, there is a very short, yet well-marked, interval of repose, subsequently to which we feel the ventricles swell anew, with the dull sound, and gradual progression, which characterize their action. Then follows the quick and sonorous contraction of the auricles; and again the renewed, but momentary, immobility of the heart.

Hypertrophia of the ventricles, when in a moderate degree, presents, in some respects, only an augmentation of the natural action of the heart. The contraction of the ventricles becomes less noisy, and more readily distinguishable from that of the auricles. After the latter, the interval of quiescence is well marked, and contrasts very sensibly with the sound that precedes, and the motion which follows it. But in hypertrophia, carried to a very high degree, the rhythm of the heart is singularly changed. In this case the contraction of the ventricles is greatly prolonged. This, at first, is perceived as a profound and obscure motion, which gradually augments, elevates the applied ear, and then terminates in producing the impulse or shock. This contraction is unaccompanied by any noise; or, if that exists, it is merely a sort of murmur, like that of respiration. The interval of repose no longer exists, or is lost in the commencing contraction of the ventricles. The contraction of the auricles is extremely short, and almost, or altogether, without sound; and in some cases the systole of the ventricles seems scarcely over before they begin to swell afresh. In extreme cases, there is no sound distinguishable but the murmur above mentioned; and we merely recognize an elevation of the heart corresponding to each beat of the pulse. In these cases, the increased brevity of the auricular contraction is not the consequence of their diminished contractility merely, but also of their contraction commencing before that of the ventricles has entirely ceased.

When the walls of the left ventricle are naturally thin, or have become so from dilatation, the rhythm of the heart's action is quite different. In this case the interval of repose, after the contraction of the auricles, is no longer perceptible. The contraction of the ventricles is more sonorous, more resembling that of the auricles, and more approaching the latter in duration. In this condition of the heart, there is, as already observed, a less degree of impulse during the contraction of the ventricles, and a greater extent in the pulsation of the heart. This condition of the organ of circulation is congenital in many cases. It does not necessarily abridge life, but is usually conjoined with a delicate constitution.

Actual dilatation of the heart produces merely an increase of all the characters which indicate a heart with thin parietes. The contraction of the ventricles becomes as short and noisy as that of the auricles; the pulse consequently becomes very frequent, and the isochronism of the arterial pulse,

and the contraction of the ventricles, becomes quite undistinguishable. In addition to these signs, we must add, the absence of any sensible impulse; the extension of the sound of the heart's pulsation over the whole or greater part of the chest, and the existence of this in as great force under the clavicles and the axilla as in the region of the heart itself. This last character particularly may be regarded as pathognomonic, if the patient is not phthisical nor pectoriloquous in the places mentioned."

(To be concluded next week.)

Printed and Published by G. L. Hutchinson, at THE LANCET Office, 210, Strand, London; where all Communications to the Editor are requested to be addressed (post-paid). This work is published at an early hour every Saturday morning, and sold by all Booksellers in the United Kingdom.